"JOURNEY INTO THE HILL STAR MAP"

presented by
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I became interested in UFO's after reading Jacques Vallee's Anatomy of a Phenomenon late in 1966. Previously, Interrupted Journey had been read in the Post, but I didn't take it seriously, as I did not know about the many worldwide humanoid encounters. Once my interest was aroused, I remembered the star map (supposedly shown to Betty Hill by a UFOnaut). Here was something that could be checked. Either it represented a real set of stars which might be found and tell us something about the UFOnaut, or it might be remembered too poorly to help, or was totally fictitious. Even if a similar set of stars were found, it might be coincidental. But, unlike most UFO reports, the possibilities could be examined and the data re-checked.

Two years passed before I finally found a source for the data needed to build the models. During that time, everything available pertaining to astronomy, exo-biology, and hypnosis was eagerly devoured. Several methods for building the models were explored. Connie Lowien, now Mrs. Jeff Limpert, my niece, added several good ideas on format.

The data for the 10 parsec model was obtained in August, 1968; the data correlation begun; and the 10 parsec model completed in December, 1968. Most of the pattern was found in June and July of 1969. Betty Hill was contacted, then visited in August. Gliese's 1969 Near Star Catalog came out in December, and the stars rechecked, but the last three stars were still elusive.

During the summer of 1972, I made a catalog of all the stars in the Gliese Catalog that might have terrestrial planets with native life. The stars were coded according to probability. Then new models were made using these stars, and in the fall of 1972, the last three stars with lines and the triangle stars were found; and work on the outer dimensions of the space represented by the map started. This was narrowed down within one light year in December. Work on all the stars in the map was tentatively concluded in February, 1973.

EXOBIOLOGICAL CONSIDERATIONS

To understand which stars could have planets with life, it is necessary to get an over-all view of types of stars and their special properties, and the conditions that would allow life to arise.

<u>Necessity for Stable Heat Conditions.</u> For life to begin (at least terrestrial life as we know it), the star must give off steady heat with very little fluctuation. Chemical processes that make up life require long molecular chains that can build up and break down easily. If the temperature is too hot, the chains break up but don't rebuild. If the temperature is too cold, the chains are too stable and metabolism does not take place. A liquid (or possibly dense gas) would be best for the chemical reactions to take place. Liquids stay liquid within a relatively narrow temperature/pressure range, again requiring relatively stable heat. If there is too great a fluctuation, life that might have started cannot get established to the point where it can reproduce. Once life is firmly established, some forms can mutate to compensate for conditions at either temperature extreme of a stable environment to fill all the niches in an environment, but this is a relatively long process.

<u>Life Cycle of a Typical Star and Stable Heat.</u> When the star is on the main sequence, its hydrogen burning phase, it is burning at its steadiest for the longest period of its existence.

Before a star joins the main sequence, it is thought to be larger, less dense, with a cooler surface, so a color more on the red side of the spectrum than it will have on the main sequence, and variable: contracting because of gravitation, heating up because of the contraction, and expanding again. Once it heats to the point of hydrogen nuclear reactions, it steadies and joins the main sequence. As the hydrogen is used up, the star's atmosphere is thought to expand. The color moves more to the red side of the spectrum again and the star becomes variable, expanding and contracting. The variation of heat, and the expanding envelope of the star's atmosphere would destroy life on its planets. If the star is massive enough, later in this process, the star novas and matter is thrown off. The core of the star that remains is a white dwarf which gradually cools and darkens.

Life as we know it would only exist, native to a star system, when the star is on the main sequence, or possibly in the very beginning of the subgiant stage, and only if the star stays on the main sequence long enough for life to form.

<u>Kinds of Stars on the Main Sequence, and Their Relation to Life.</u> There are 7 main spectra groups of main sequence stars. These are, going from the most massive to the least massive, from the hottest to the coolest, from bluish to red: OV, BV, AV, FV, GV, KV, MV. Each of these groups is divided into 10 subgroups of descending size. Thus B9V is closer in size and characteristics to AOV than to BOV. Theoretically there are 70 subgroups within these 7 groups but not all of these are used regularly.

Star types 0, B, A and down to F2 are massive hot stars. Gravity forces the atoms closer together so atomic reactions take place at a faster rate than on smaller stars. So, although they have more matter, they burn faster, and last for a shorter period on the main sequence, not long enough for life to form if it takes as long as it did on Earth. Almost all of these stars are rotating fast, indicating that they probably do not have planets. There is very little chance for planets with life around these stars.

F2V to F5V could support planets with the beginnings of life but not all of these stars are rotating slowly so probably many do not have planets. In an F2 system, life might just be forming as the star starts to leave the main sequence.

F5V to F7V have more stars rotating slowly indicating the possibility of planets.

From approximately F8 on, all main sequence stars are rotating slowly, probably indicating planets. According to Carl Sagan, F8 is the point where intelligent life would have time to emerge. So main sequence stars from F8 through the Gs, to the early Ks have a possibility for life, including intelligent life.

Many exobiologists place the break-off point for life in the early Ks, usually K2. A few extend it to KS. Stars get progressively cooler. With late Ks and Ms the stars are so cool a planet would need to be very near the star's surface to get enough heat for life processes. This raises problems of synchronous rotation, but one of the biggest problems is solar flaring. Apparently tiny stars have the same kinds of solar flares as stars like the sun. On the sun a solar flare changes the over-all output of energy very little, as there is so much total radiating surface besides the flare. On a small star, the same size flare may give off many times the star's usual energy, destroying any life that might be on a nearby planet.

To summarize, the best chance for life is F8, all Gs, through KO, especially where the KO and G8 groups overlap. There is a possibility for terrestrial life and/or colonization around F5 to F7 stars, and much more remotely F2 to F5. There is some chance for life in K1 and K2 systems, and possibly, in special cases K2 to K5, but little around stars smaller than K5.

<u>Single Stars Versus Multiple Stars and Terrestrial Planets with Life.</u> Double and other multiple stars present many problems that may prevent the origin of life. Dr. Kuiper worked out an extensive theory in 1956 that multiple stars do not have planets. Even if this is not correct, life formation requires stable heat. Stable heat requires a stable orbit. Stable orbits are difficult to maintain in multiple systems due to multiple and variable gravitational pulls. There is also the possibility that multiple stars may affect each other's time on the main sequence, shortening the time, so life would have less chance to form.

Single stars are much more likely to have planets with life, and possibly ONLY single stars have planets. The pattern, like Betty's, is made up only of single stars.

<u>Variability and the Main Sequence.</u> The main sequence is the one point in a star's existence when it is the least variable. However, I found that 1/3 of the single, main sequence stars in the best range for life in a 10 parsec radius of Earth were probably variable, although I could find no reason why the percentage is so high. The ratio dropped to 1/20 in the 10 to 20 parsec range, so we probably are not catching the variability in these stars. If the star is variable, chance for life is very small.

<u>Summary of Exobiological Considerations.</u> Single main sequence stars F8, G, to KO non-variable stars have the best chance for planets with life, including intelligent life. Similar stars F5 to F7 and K1 and K2 might support systems with life. F5 to F7 might be especially good to colonize since the ecozone (life zone) is wider than around cooler stars but they are less likely to have indigenous life. In other words, stars like the sun are the most likely to have life on their terrestrial planets.

<div align="center"><u>THE 10 PARSEC MODEL DATA</u></div>

Using the latest data, 12 out of 201 systems, or approximately 6%, or using known components (259), about 5% of the stars are suitable for life. Actually the percentage is probably considerably lower as there are many faint small near stars we haven't discovered yet. These twelve stars are Sol, Zeta Tucanas, 107 Piscium, Tau Ceti, Gliese 75, 82 (e) Eridani, Chi 1 Orionis, Alpha Mensae, Beta Virginis, Beta Canum Venaticorum, Beta Comae Berenices, and 61 Virginis.

The 1968 10 parsec model contained all the then-known stars (minus one) within 10 parsecs plus additional brighter stars beyond this range to fill in the cube beyond the 10 parsec sphere. These additional stars included Zeta 1 and 2 Ret., 54 Piscium and Gliese 67. Because of these additions the pattern was found.

Stars were not scattered randomly. Stars of similar size tended to be together although there was some mixing There was a large area covering almost half the volume of the model that contained no stars suitable for life and a large part of this volume had practically no stars at all. The sun was on the edge of this area so somewhat isolated. Since the sun was supposed to be in Betty's map, and only part of the area near the sun had suitable stars, the search was narrowed and simplified.

Originally the pattern was checked through all main sequence stars capable of having planets, including doubles which may or may not have planets. Then most of the pattern was found except Gliese 86, 59 and 111 which were beyond the range of the model and data available in 1968 and early 1969. Once the kinds of stars that made up the pattern was realized and more accurate data obtained, models that extended further than 10 parsecs were built which led to the missing stars.

<u>BETTY'S STAR MAP AND REALITY</u>

In referring to the actual star pattern that resembles Betty's map, the name, Psyche, will be used. Dr. David Saunders proposed the name and Betty and I agreed enthusiastically.

<u>Assumptions Made in Checking</u>

1. The map appeared to be made from the area near (or point of view of) the base stars. Parallax shifts would make Earth-based star maps useless. A model would be one way of handling the problem of parallax shifts.

2. The sun was in the map, presumably with a line to it.

3. At least one of the base stars should be able to support life. This means it should be main sequence, at least K5 or brighter, probably brighter than K1 but less than F7, since Sagan puts the probable start of intelligent life at F8.

4. Since they come to the sun, stars like the sun should be equally interesting to them, at least single, nonvariable main sequence G stars, probably late F, and possibly early Ks.

5. The base stars are the two large circles with the lines radiating from them.

6. The travel pattern should be logical.

7. Other stars suitable for planets but not life might or might not be visited so should be checked. Since there is a controversy whether multiple stars have planets or not, they should be checked.

Map Facts

1. The map was 3-D.

2. The stars glowed.

3. The stars were tinted.

4. There were no grid lines.

5. There was no concentration of stars, so the galactic plane concentration of stars (Milky Way) was not apparent, probably showing (if the map represented reality) only local stars were in it. Another possibility would be that only selected stars were in it. But since they were interested in the sun, and there are a number of stars similar to the sun in the local neighborhood, Psyche, if it existed, would still be local.

6. The map was about 3 feet long by 2 feet high.

7. The map was similar to a reflective hologram. The map material was thin. It had no linticular lines as in one of our 3-D processes. It was not a projection.

8. The map was done as a posthypnotic suggestion to be drawn only if it was not remembered accurately. She was not to pay attention to what she was drawing. This puts it in the realm of automatic drawing which can be very useful and accurate in bringing to the surface (sic) forgotten and repressed material.

Proof That the Map is not a Hoax

1. No earth astronomer in 1961-1964 would have known the triangle background stars existed as a cluster in its present position because:

A. The parallax (distance measurement) of 86.1 had not been taken then. Its position was printed in 1969.

B. The distance of Gliese 97 was thought of as 55.2 light years which would put it beyond Gliese 111 before the
1969 catalog.

C. The distance of Gliese 95 was thought of as 37.5 light years (pi.087 ±11) or 35.8 light years (pi..091) before the 1969 catalog. This would move it above rather than below the line of Gliese 111.

Only correlation of several different types of parallax measurement (spectral, photometric, and trigonometric) result in the present more accurate parallaxes. Earlier catalogs usually used just one type of measurement.

The triangle would be remembered as it is very near the surface of the map and is quite prominent.

2. The earlier parallax for Gliese 86 would put it at a much poorer angle.

3. Variable main sequence single stars were avoided. They would be unlikely for life because it requires even heat over a long period of time to develop. The probable main sequence variable stars are marked "var?" in the Catalog of Bright Stars by Dorrit Hoffleit which was published in 1964. Betty's experience was in 1961. The map was drawn early in 1964. It is very unlikely that she could have had access to the catalog even if she knew how to interpret it, and if it was released before she drew the map. (It took me two years to see the catalogs even though I knew what I needed generally. They are not found in normal university libraries, much less local ones, and book stores do not carry them. Some cannot even be purchased from the author.)

The fact that these main sequence single F5-G-K1 stars are probable variables was not caught by astronomers who specialize in stars that might have planets with life, even in recent books. Delta and Gamma Pavonis, Sigma Draconis, Beta Hydrus etc. are some of the stars listed as good for life, but which are really probable variables. This shows the map maker knew variables should be avoided and which stars were variable.

4. Many exobiology books list doubles as suitable for planets with life. Kuiper s work showing that planets are not likely to develop in a multiple system was published in 1955, but it is apparently not well known. Even if multiple stars can have planets, circular orbits in the ecosphere would be difficult to maintain. Normal doubles were avoided in the lined portion of Psyche.

Epsilon Eridani was announced to be a multiple system in March 1973 by Dr. Peter van de Kamp. Its companion is halfway between a planet and a star in mass. It was avoided in Psyche, although it is near Tau Ceti and the sun. Before 1973 exobiologists considered Epsilon Eridani one of the best prospects for life, and it was part of the Ozma study. The mapmaker knew it should be avoided long before we did.

Proof that the Similarity Between Betty's Map and Reality is not Coincidental

1. The top and bottom surface of the depth of Psyche are squares. The height of the map is 2/3 the size of the square. It is highly improbable that this could be coincidental.

2. The lines represent a logical travel pattern to investigate all the best stars for life from Zeta Reticuli, best star for life to the next best (closest) star for life to the next closest, etc.

3. The double dotted line to Tau Ceti represents two expeditions. Two expeditions were likely, the first to 82 Eridani to Tau Ceti to Earth, since the sun is closer to Tau

Ceti than 107 Piscium is to Tau Ceti. The dotted (expedition) line to the sun was dropped when the solid line directly from Zeta Reticuli was put in, just as all the dotted lines were dropped when solid lines were put in to 82 Eridani, Alpha Mensae and Gliese 86. The second expedition went from 82 Eridani to Tau Ceti, then in the opposite direction from Earth to 107 Piscium.

4. Only the best stars for life are used. These are non-variable main sequence stars, F6-G-K1, absolute magnitude 3.7 to 5.9. To show the proportions of these stars to all stars, the stars within the volume of a sphere with a radius of 10 parsecs (32.59 light years) was used. There are twelve such stars compared with 201 known systems and 259 known components in this volume. This gives a ratio of 1/17 and 1/21 respectively. I spent over six months checking all possible combinations using all kinds of main sequence stars F2 and dimmer, including doubles, in the 10 parsec model. The only one that resembled Betty's map was that part of Psyche within the model. Since the-best-stars-for-life ratio is so small compared to stars in general, it is hardly coincidental that the only pattern like Betty's should be made up solely of these stars.

5. All the stars suitable for life in the Psyche volume are included in Betty's drawing.

DISCREPANCIES

The background stars, with the exception of the triangle which has relatively bright stars near the surface of the map, were put in just to show there were background stars. These probably do not represent individual stars.Betty concentrated on the stars connected with lines. There are over 100 stars in the Psyche volume.

Betty saw the lined pattern as a whole and the triangle as a whole but did not draw them to the same scale.

The line to Alpha Mensae is an extension of the Gliese 86-Zeta Reticuli line. On this line, her conscious mind took control. She erased twice and put it in wrong. A projected image of a slide of the model on a tracing of Betty's map shows the correct line was probably the top erased line, although the lower erased line is closer to the correct line length. Correcting this angle also corrects the angle to Alpha Mensae.

If the top erased line is used, the angle made by the two base stars does not quite correspond. This is an error in the model, not Betty's map. Zeta Reticuli 2 actually is more to the right from this viewing angle. They were using a much larger scale. There is a visual separation of about 1/20 light year if they are 36.6 light years away. On the largest scale I've used so far, 1/4" per light year, this move to the right can't be shown. (actually they may be over 1 light year apart as parallax measurements out that far are not too accurate). The two base stars are very near the map's surface, and using a much larger scale, their separation would be dramatized.

There are slight differences in line length and angles as in any freehand drawing. Compare for yourself the projected slide of the model on Betty's drawing.

CONCLUSION

Since we did not have the data to make such a map in 1961 when Betty saw it, or in 1964 when she drew it, it could not be a hoax. Since the stars with lines to them are such a select group, it is almost impossible that the resemblance between Betty's map and reality could be coincidental. Betty's map could only have been drawn after contact with extraterrestrials.

Figure 1: ID of Stars in Model

Figure 2: Betty Hill's Map minus background stars

Figure 3: Betty's map with a slide of the model projected on it.

Figure 4: The space volume similar to Betty Hills map, psyche

PARTIAL LIST OF STAR CATALOGS USED:

Aitken, Robert G., 1935. The Binary Stars; McGraw-Hill.

Batten, Alan H., 1967. Sixth Catalogue of the Orbital Elements of Spectroscopic Binary Systems, Publications of the Dominion Astrophysical Observatory, Victoria, B.C., Volume XIII No. 8, Canada Department of Energy, Mines and Resources, Observatories Branch.

Gliese, W., 1957. Katalog der Stern Näher als 20 Parsek für 1950.0.

1969. Catalogue of Nearby Stars, Edition 1969 Veroffentlichungen des Astronomishen Rechen-Institute, Heidelberg Nr. 22 Verlag G. Braun, Karlsruhe

Hoffleit, Dorrit, 1964. Catalogue of Bright Stars, data compiled through 1962, Third Revised Edition, Yale University Observatory, New Haven, Connecticut.

Jaschek, Carlos, Conde, Horacio, y de Sierra, Amelia C., 1964. Catalogue of Stellar Spectra Classified in the Morgan-Keenan System; Observatorio Astronomico de la Universidad Nacional de la Plata. Serie Astronomica XXVIII (2)

Jenkins, Louise F., 1963. General Catalogue of Trigonometric Stellar Parallaxes, Yale University Observatory, New Haven, Connecticut.

Van de Kamp, Peter. Lists of stars within 5 parsecs.

Marjorie Fish
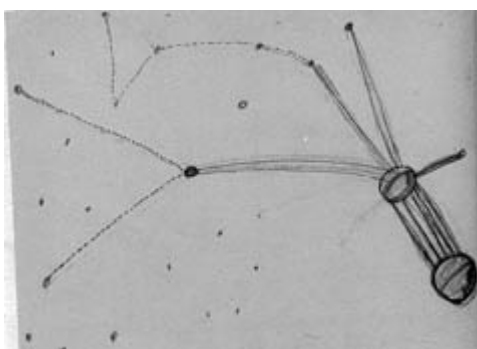
The Hill Sketch

Marjorie E. Fish first became interested in UFO's in 1966 while reading "Anatomy of a Phenomenon" by Dr. Jacques Vallee. Her interest in UFO's was intense because of her prior studies of anthropology, biology, psychology, and animal behavior. Alternate ways of living, thinking, perceiving, and differences in biological systems are fascinating to Miss Fish, and integrating them into an understandable whole is an important avocation. She believes that extraterrestrial life forms and civilizations could give us a real "mirror for man," a comparison that could possibly answer many of the questions that have baffled man through the ages, questions of our nature, biology, and philosophy, which we are too close to to see the answers.

Marjorie Fish was born in Cleveland, Ohio, on September 19, 1932. She received a B.S. degree in Sociology from Juniata College in Huntingdon, Pennsylvania, in 1954, graduating with distinction. She minored in Science. Miss Fish retrained for Elementary Education at Bowling Green State University in Bowling Green, Ohio, from June of 1962 to August of 1964.

Miss Fish has been teaching school in the state of Ohio for eleven years. She is affiliated with the Unitarian Church. Her hobbies and general interests are varied:

reading, photography, art, carpentry, gardening, crafts, music, anthropology, ancient civilizations, astronomy, botany, mythology, psychological research, and zoology Her unique three-dimensional model of the near stars is now being used by the Astronomy Department at Ohio State University at Perkins Observatory in Delaware, Ohio. Miss Fish spent six years in intensive research of the near stars and factors necessary for life.

Miss Fish's address is P. 0. Box 128, Oak Harbor, Ohio 43449.
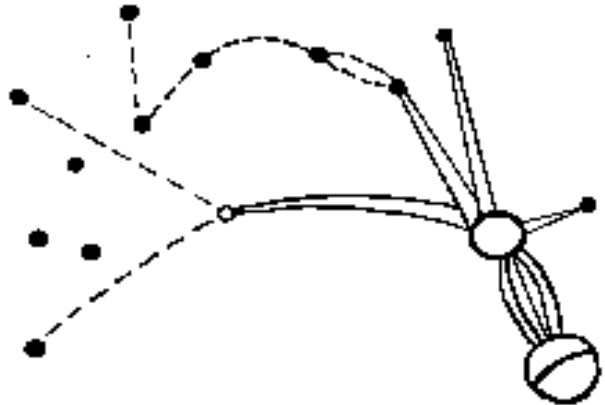
<u>CHRONOLOGY</u>

<u>IDENTIFICATION OF THE STARS IN THE MODEL</u>
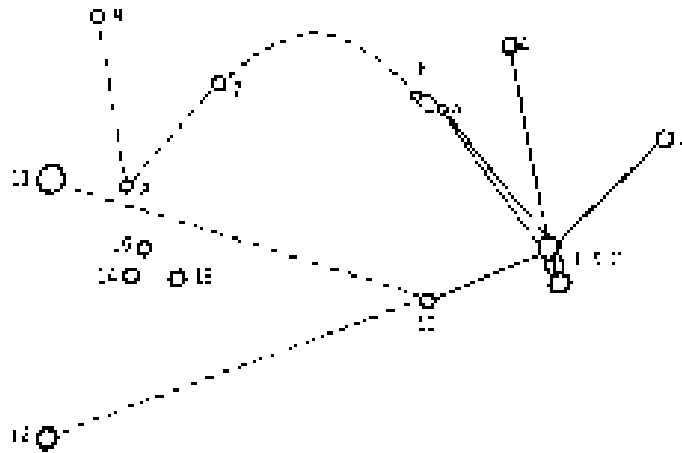
	<u>Gliese No</u>.	<u>Name</u>
1.	136	Zeta Reticuli 1
	138	Zeta Reticuli 2
2.	17	Zeta Tucanae
3.	231	Alpha Mensae
4.		Sun
5.	139	82 Eridani, e Eridani
6.	71	Tau Ceti
7.	68	107 Piscium
8.	27	54 Piscium
9.	67	BSC 2050
10.	86	GC 2610
11.	111	Tau 1 Eridani
12.	59	GC 1883

13.	86.1	HD13435
14.	95	GC2794
15.	97	Kappa Fornacis

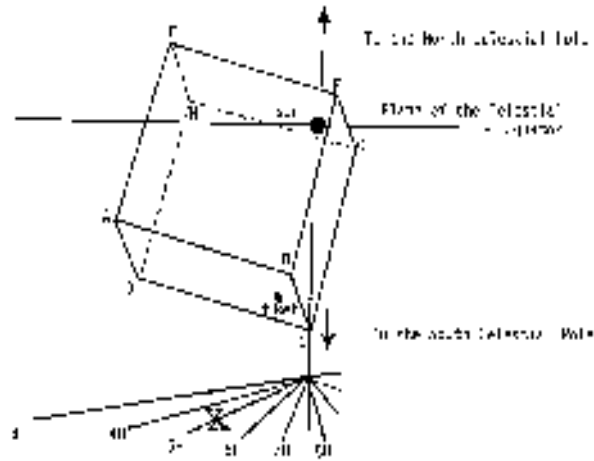## BETTY HILL'S MAP MINUS BACKGROUND STARS

BETTY'S MAP WITH A SLIDE OF THE MODEL PROJECTED ON IT
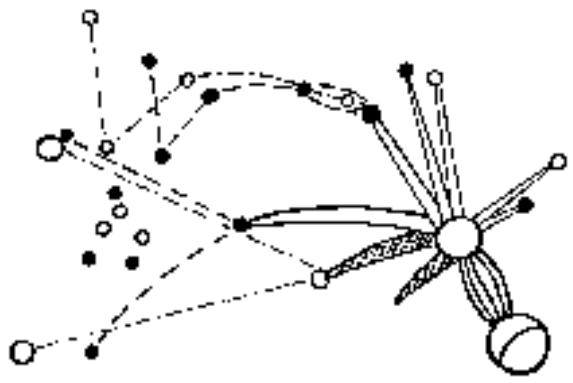
— — Betty's drawing

XXXX Lines Betty erased

— . — Photo of the Model with Lines Drawn to Connect the beads

- - Betty's drawing
xxx Lines Betty erased
- . - Photo of the Model with lines drawn to connect the beads

THE SPACE VOLUME SIMILAR TO BETTY HILL'S MAP, PSYCHE

X = Betty's viewing position
ABCD = The map surface
ABFE = and DCGH are squares with sides 48 light years + or - <1 light year long.
AD and BC are 32 light years + or - <1 light year long.

COORDINATES FOR THE VOLUME

A	3	24	-11	53.3
B	7	4	-50	38
C	23	24	-76	44
D	1	13	-24	57.4
E	1	49	+44	42
F	13	0	+34	17
G	18	26	-7.5	27.8
H	23	8	+19.3	47.3

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